BACKGROUND

Field of the Invention

[0001] The present invention is directed to a valve, and more specifically to an automatic valve for a spill-proof type beverage dispenser.

Background of the Invention

[0002] Spill-proof beverage dispensers are known in the art and are utilized most notably for the purpose of preventing inadvertent spillage of liquid from a beverage dispenser, such as a cup. For example, if a spill-proof cup is dropped or knocked over, it is intended that a majority of the liquid be retained therein. The retention of liquid therein lessens the waste associated with spilled beverages, reduces the work associated with beverage spill cleanup, and reduces potential economic consequences of destruction caused by any such spillage. More specific applications of spill-proof beverage dispensers may be directed to children's cups where one or more valves are incorporated or mounted therein, allowing the child to remove liquid from the cup when in the act of drinking and concurrently inhibit the unintended removal of liquid therefrom when not in the act of drinking.

[0003] U.S. Patent No. 6,422,415 assigned to Playtex Products, Inc., discloses a drinking cup assembly having a valve assembly of the type that is generally used in spill-proof-type drinking cups. The valve disclosed in that patent is characterized in that the drinking valve and the vent valve are slit valve and are both mounted on stacks that are received in projections from the top lid of the cup. While this design has been generally effective, it has been found that over time the slit valve used as the primary drinking valve can breakdown leading to unwanted leakage. Additionally, the stacks are fairly narrow thereby allowing the possibility that food can get stuck therein making cleaning difficult.

[0004] U.S. Patent No. 5,988,425 assigned to Evenflo, Inc. also discloses a spill-proof-type cup having a valve assembly of the type discussed herein. While this design has proved adequate, over time it has been found that the use of a vented thread system is generally not as effective as a slit-type valve. Furthermore, the shape of the elastomeric insert that must be used in connection with such an assembly is required to be rather large thereby consuming a significant amount of material to manufacture the insert and causing it to be generally difficult to clean. The valve assembly disclosed in that patent also includes a plurality of small holes therethrough adapted to be aligned with channels within the lid that are also very difficult to clean and sanitize

[0005] Finally, U.S. Patent No. 5,890,621, assigned to Gerber Products, Inc., also discloses a valve assembly for use in the type of spill proof cups discussed herein. However, as opposed to the valve assemblies disclosed in the '415 and '425 patents, the valve assembly disclosed in the '621 patent utilizes only a single valve to allow egress of fluid to and from the container. While this single valve configuration has proved to be somewhat effective, it has generally not been as effective as corresponding two valve designs.

[0006] Accordingly, for all these reasons, a valve assembly for use in a spill-proof-type cup which overcomes the limitations of the prior art discussed above (namely, single valve configurations, slit valve openings for fluid flow from the container, thread venting structures, and extremely small openings) is desired.

SUMMARY OF THE INVENTION

[0007] The present invention is directed to a valve, and more specifically to an automatic valve for a beverage dispenser providing for selective ingress of gas into the dispenser and selective egress of liquid from the dispenser. The valve is adapted to regulate the flow of gas into, and the flow of liquid from, the beverage dispenser. As will be discussed in more detail below, at least a portion of the valve is adapted to be removable

from a beverage dispenser lid and work in tandem with the configurations of the lid to facilitate selective egress of liquid from the beverage dispenser.

[0008] The valve of the present invention comprises an elastomeric insert adapted to interface with features on the underneath surface of a beverage dispenser lid. The insert is mounted to the lid, at least in part, by a combination snap-fit and a friction fit. Orifices in the lid correspond with a spout for withdrawal of liquid from the dispenser and an air intake to facilitate the withdrawal through the spout. The elastomeric insert deforms under the siphoning conditions to provide direct fluid communication between the liquid within the dispenser and the opening in the spout. If the siphoning discontinues or the siphon is not strong enough, the insert will not substantially deform to provide such direct fluid communication, thereby inhibiting liquid from exiting the dispenser. An air intake, regulated at least in part by the insert, allows for gas to enter the dispenser to occupy the volume previously occupied by liquid that has exited the dispenser. In this manner, the siphoning pressure to withdraw liquid from the dispenser may remain relatively constant.

[0009] As discussed in more detail below, the present invention recognizes the utility of having two openings within the top of the lid to provide the ingress of air into the container and the egress of fluid therefrom, as opposed to utilizing the threads of the container for the ingress of air flow. Likewise, the present invention includes a valve system having a single larger opening, as opposed to multiple small openings taught in the prior art, while still maintaining a fluidic seal when appropriate. Still further, the present invention makes use of dual friction fits or wedge fits that wedge the lid between at least two walls associated with the insert. Finally, the present invention acknowledges that reduction in the overall dimensions of the valve insert can substantially reduce raw material expenditures and likewise reduce overall production costs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is an elevated perspective view of an exemplary valve insert in accordance with the present invention;

[0011] FIG. 2 is an overhead view of the exemplary valve insert of FIG. 1 in accordance with the present invention;

[0012] FIG. 3 is an elevated perspective, cross-sectional view of the exemplary valve insert of FIG. 1 in accordance with the present invention; and

[0013] FIG. 4 is a cross-sectional view of an exemplary beverage dispenser of the present invention incorporating the exemplary valve insert of FIGS. 1-3.

DETAILED DESCRIPTION

[0014] The exemplary embodiments of the present invention are described and illustrated below to encompass valves, systems, and methods for regulating the flow of liquid from a beverage dispenser. Of course, it will be apparent to those of ordinary skill in the art that the preferred embodiment discussed below is exemplary in nature and may be reconfigured without departing from the scope and spirit of the present invention. However, for clarity and precision, the exemplary embodiment includes one or more optional features that one of ordinary skill may recognize as not being a requisite to fall within the scope of the present invention.

[0015] Referencing FIGS. 1-3, an exemplary valve insert 10 in accordance with the present invention includes a platform 12 having a tower 14 at a first longitudinal end 16 at least partially circumscribed by a raised wall 18. A second longitudinal end 20 includes a depression 22 extending through the platform 12 and adjacent to a circular opening 24 therethrough. Two wings 26, 28 flank the opening 24 and embody a dominant widthwise dimension.

[0016] As shown in FIG. 2, the overall shape of the platform 12 is semicircular at the second longitudinal end 20, transitioning into the rounded rectangular wings 26, 28,

which narrow to define a throat 30 giving rise to the oblong first longitudinal end 16. The oblong shape is indicative of the oblong shaped, discontinuous raised wall 18 that tracks the oblong shape of the tower 14. A generally uniformly spaced trench 32 results from the offset between the tower 14 and the raised wall 18.

[0017] Referring to FIGS. 1-3, the tower 14 includes a reinforced wall 34 having a circumferential thickness exceeding that of the median wall thickness of a remainder 35 of the tower 14. The reinforced wall 34 extends downward to meet a floor 36 partially bounding an interior region 38 within the tower 14. The area between the floor 36 and the platform 12 may be solid or reinforced to impart stability to the floor 36 and more limited flexibility to the walls 34, 35 adjacent thereto. The distance between the floor 36 and the top 40 of the tower 14 may be partially determinative of the degree of flexibility exhibited by the tower 14. Presuming the composition of the tower 14 is of a relatively uniform elastomeric material, the shorter distance between the floor 36 and the top 40 provides comparatively less flexibility/movement at the top 40 of the tower 14, as opposed to a longer distance between the floor 36 and the top 40. As would be obvious to one of ordinary skill in the art, varying the materials comprising the tower walls 34, 35 may also be varied in order to impart the desired flexibility/movement.

[0018] Referencing FIGS. 3 and 4, an exemplary polypropylene beverage dispenser 50 includes a lid 52 having a spout 54 integrally formed therein. The spout 54 includes a generally conical projection having a generally frustroconical end 56 that includes at least one opening 58 therethrough to provide direct fluid communication with a chamber 60, which includes the interior region 38 of the tower 14. The base 61 of the spout 54 is molded into an outer circumferential wall 62 and a corresponding inner circumferential wall 64 that define a recess 66 adapted to receive a circumferential lip 68 of a cup 70. Both the outer circumferential wall 62 and the circumferential lip 68 include spiral threads 71 adapted to interface with each other to direct the lip 68 into the recess 66 and provide a fluid-tight seal therebetween. The top, central aspect of the lid 52, approximate the base 61 of the spout 54, includes an opening 72 therethrough to facilitate selective

fluid communication between an interior 74 of the beverage dispenser 50 and an external environment 76.

[0019] The opening 72 provides direct fluid communication between the external environment 76 and a cavity 88 bounded in part by a circumferential wall 90 extending downward from an underneath surface 92 of the lid 52. The remainder of the cavity 88 opposite the opening 72 is bounded by the depression 22 of the valve insert 10. At least one of the circumferential wall 90 and an interior wall 94 partially defining the depression 22 may be tapered to facilitate insertion of the circumferential wall 90 into the depression 22. The depression 22 also includes a circumferential recess 96 adapted to interface with a stepped ledge 97 of the circumferential wall 90 to couple the insert 10 to the lid 52 once the stepped ledge 97 has passed beyond the recess 96. After the ledge 97 passes the recess 96, the depression 22 circumferentially contracts to lock the ledge 97 therein and provide a snap-fit. The depression 22 likewise includes a slit 98 at the bottom thereof to allow for the ingress of air from the external environment 76, through the opening 72, and into the interior 74 of the beverage dispenser 50.

[0020] The insert 10 is also mounted to the lid 52 by a first friction fit between a downwardly depending wall 99, extending from the underneath surface 92 of the lid 52 approximate the frustroconical end 56, and the combination of the raised wall 18 and the tower 14. A second friction fit occurs between the exterior circumferential surface 100 of the tower 14 and the inner circumferential surface 102 of the downwardly depending wall 99. A conduit 104 is formed within the wall 99 that may provide fluid communication between the interior 74 of the beverage dispenser 50 and the chamber 60 upon displacement of at least a portion of the exterior circumferential surface 100 of the tower 14 from the inner circumferential surface 102 of the downwardly depending wall 99.

[0021] In operation, the beverage dispenser 50 is grasped by a user (not shown) and the spout 54 is positioned approximate the mouth of the user, thereby bringing liquid within the dispenser in direct communication with the conduit 104. The user then reduces the pressure approximate the opening 58 (as compared to the pressure within the interior 74

of the dispenser 50) and likewise within the chamber 60, causing the remainder 35 of the tower 14 to become displaced from the inner circumferential surface 102 of the downwardly depending wall 99 toward the center of the tower 14. The reinforced wall 34 of the tower 14 is also drawn away from the inner circumferential surface 102 and toward the center of the tower 14 as the pressure is further decreased. Eventually, the movement of the reinforced wall 34 is sufficient to displace the reinforced wall 34 from the conduit 104 opening, thereby providing fluid communication between the liquid within the dispenser 50 and the opening 58. The flow of liquid from the interior 74 of the dispenser 50 likewise results in a temporary decrease in internal pressure within the dispenser 50. Gas from the surrounding environment 76, at a higher pressure than the temporarily decreased internal pressure of the dispenser 50, flows through the opening 72, into the cavity 88, through the slit 98, and into the interior 74 of the dispenser 50. The slit 98 ensures that liquid from the interior 74 of the dispenser 50 does not exit the dispenser under normal operating conditions.

[0022] Upon an increase in pressure approximate the opening 58, (as compared to the pressure facilitating fluid communication between the liquid within the dispenser 50 and the opening 58 is available) the reinforced wall 34 of the tower 14 is deflected toward the inner circumferential surface 102, thereby preventing fluid communication between the opening 58 and the interior 74 of the dispenser 50 by way of the conduit 104. Similarly, as the pressure at the spout 54 approaches ambient, the remainder 35 may also deflects toward the inner circumferential surface 102 to prevent further fluid egress from the dispenser 50.

[0023] Following from the above description and invention summaries, it should be apparent to those of ordinary skill in the art that, while the apparatuses described herein constitute an exemplary embodiment of the present invention, the invention contained herein is not limited to this precise embodiment and changes may be made to such embodiment without departing from the scope of the invention as defined by the claims. Additionally, it is to be understood that the invention is defined by the claims and it is not intended that any limitations or elements describing the exemplary embodiment set forth

herein are to be incorporated into the interpretation of any claim element unless such limitation or element is explicitly stated. Likewise, it is to be understood that it is not necessary to meet any or all of the identified advantages or objects of the invention disclosed herein in order to fall within the scope of any one of the claims, since the invention is defined by the claims and since inherent and/or unforeseen advantages of the present invention may exist even though they may not have been explicitly discussed herein.

[0024] What is claimed is: